Product Documentation
User Manual

SMARTONE System

Telecommunications Products

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1 INTRODUCTION

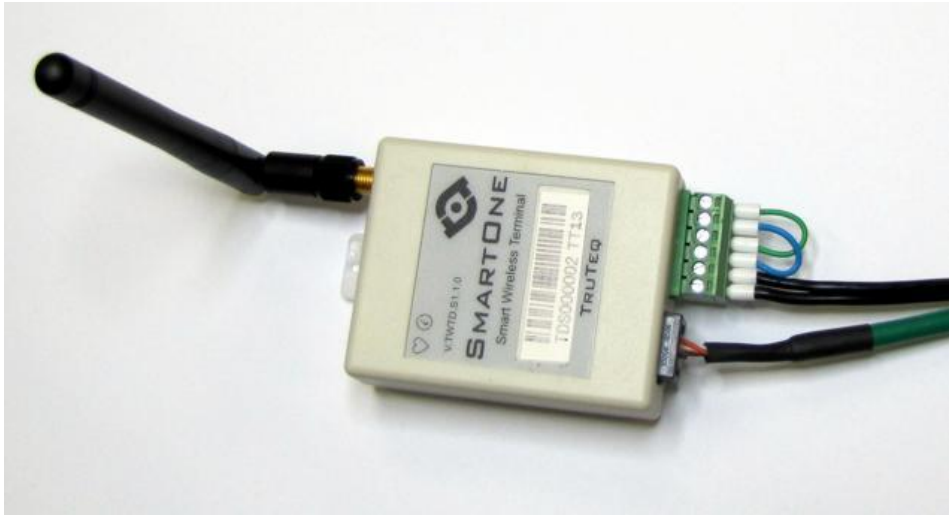
1.1 Background

The Truteq SmartOne is a versatile industrial RTU (Remote Terminal Unit) with integral modem for communications to IEDs (Intelligent Electronic Devices). It can be used in a whole range of applications in the telemetry, AMR (Automated Meter Reading), SCADA, security, farming, home and office automation industries.

1.2 SmartOne in Short

The SmartOne has the following features:

- RS232 modem port
- Activity LEDs
- External DC input
- 2 Digital Open collector outputs
- 2 Inputs (either Analog or Digital)
- Dual SIM card feature (internal Chip SIM optional)
- Data logging card
- Real Time Clock
- Easy scripting language to configure the unit



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1.3 System Description

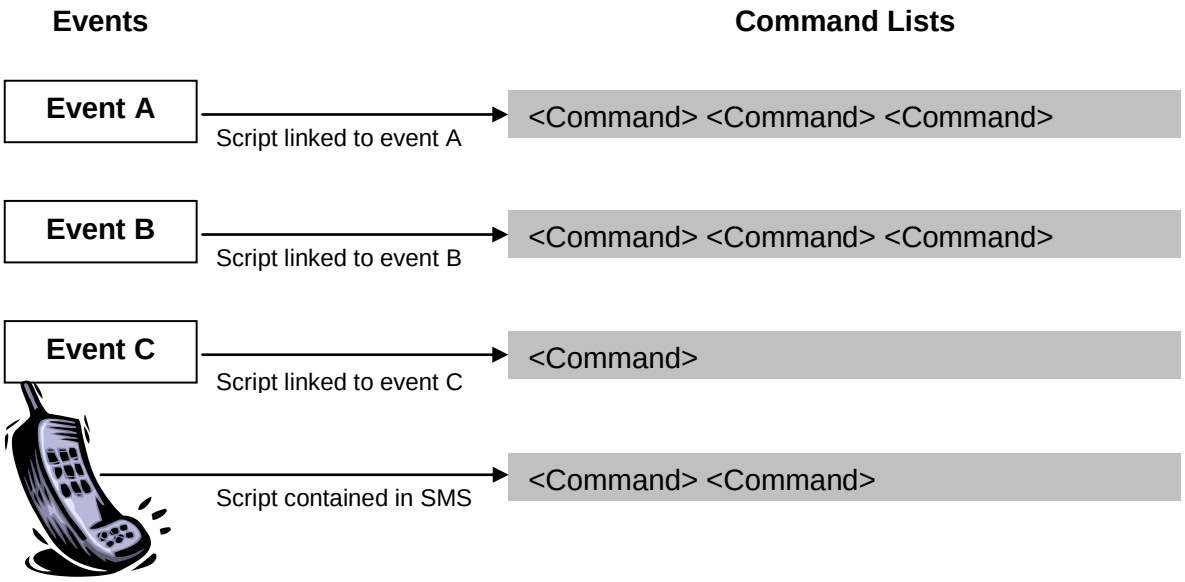
The SmartOne is a smart telemetry device, but still supports AT commands, including the Hayes command set. Even though the SmartOne can act like a GSM modem, it offers much more in terms of communications, inputs, and event-based programming.

The SmartOne is a type class B GPRS multi-slot class 10 device. It is intended for use on the 900MHz (extended) and 1800MHz GSM frequency bands.

By using simple commands, the SmartOne can switch between using CSD (circuit switched data) calls, or GPRS to communicate with a device on the serial port. Two fully programmable inputs, timers, counters, variables and other events provide a very powerful and future-proof solution for industrial communications.

The SmartOne executes the scripted Commands that are linked to all the triggered events, as well as scripted Commands received via SMS / CSD call or GPRS connection.

A triggered event can be, for instance, an input going from high to low or the timer that runs out. Commands can, for instance, send SMS, report status to a server, toggle an output or clear a timer.



SMS messages sent to the SmartOne are executed as a script.

1.4 Digital vs. Analogue

Unless specified otherwise, all inputs and outputs referred to in this manual are Digital inputs and Digital Outputs

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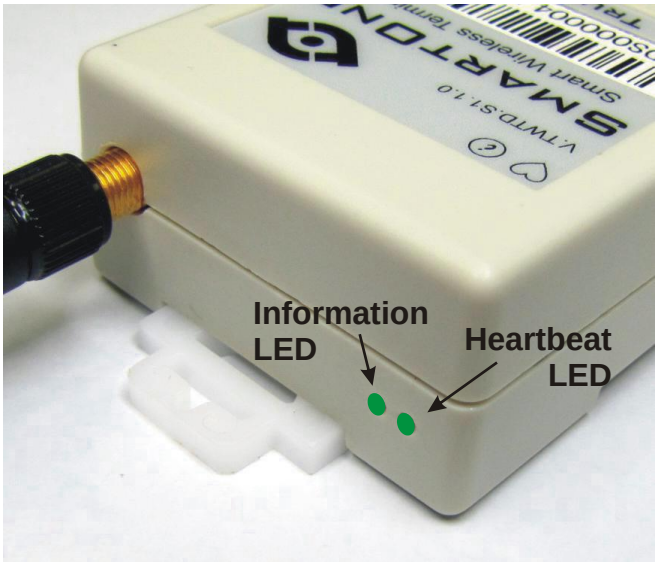
1.5 Status LEDs

Two LEDs indicate a whole list of statuses to the field installer.



Heartbeat LED:

Meaning	States
Power present	Flash. This LED will always flash in some state – also indicating the unit being on and operational
GSM Network state	50% on 50% off slow flash: No Network found Short Blip : Logged on to GSM network Double Short Blip : Logged on to GPRS network Short flash : Logged on to GSM network – low signal Double Short flash : Logged on to GPRS network – low signal
Receive	On flashing off : Modem receives data
Data Carrier Detect	On with off Blips : Busy in data call or GPRS session

Information LED:

Meaning	States
Modem Idle	LED off
SMS	50% on 50% off flash: SMS activity
Transmit	On flashing off : Modem transmits data
Data Carrier Detect	On with off Blips : Busy in data call or GPRS session

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1.6 The Ultimate in Stability – *Comm Alive!*

Telemetry users know that their devices are often in remote or inaccessible areas. The last thing they can afford is to have to continuously visit a number of sites to reset these devices.

There are four major causes of failures in GSM-based telemetry:

1. Lock-ups between modem and GSM network.
2. Not terminated data calls.
3. Loss of network authentication.
4. Unknown network or modem status.

By using proven and patented technology, the SmartOne is kept as stable as possible. **Depending on the customer's preferences on order, the modem will reset under any of the following conditions**:

1. Every 24 hours (only if not in data call).
2. If a data call is not terminated for longer than 45 minutes.
3. If the modem loses GSM network authentication for longer than 10 minutes.

If the modem is in a data call when the 24hr reset cycle starts, the modem will wait for 10 minutes before resetting.

The default reset options are :

1. Every 24 hours (only if not in data call).
2. If the modem loses GSM network registration for longer than 10 minutes.

1.7 GPRS Manager

The SmartOne uses the GPRS bearer to establish a transparent serial link between the IED and the user application.

GPRS networks have been designed for hand-held units to browse the internet with. Because of this the network will assume disconnects and re-connects from users via their hand-held units. Installing a modem in a remote and fixed location with no user intervention will require some sort of management of the GPRS link.

The SmartOne is fitted standard with a GPRS manager. This manager ensures that the modem stays ready and connected on the GPRS network. Various parameters can be set to ensure connectivity to the meter at any given time.

The manager includes a periodic ping to a specified server in order to keep the GPRS availability up.

Command 161 specifies the manager time-outs.
Parameter 1: GPRS re-attach interval. This parameter specifies the number of minutes to wait before re-attaching to the GPRS network.
Parameter 2: GPRS error re-try interval. This parameter specifies the number of minutes to wait before re-attempting to attach to the GPRS network.
Parameter 3: Connection no data flow time-out. This parameter specifies the number of minutes to allow no data to flow through an open TCP connection before assuming a 'ghost' connection.

Refer to TruTalk commands 150 to 161 for all the various options.

Combining CSD and GPRS:
The GPRS manager automatically detach from GPRS network when a CSD call comes in. The call is then answered. When the CSD session is over then the modem will re-attach to the GPRS network.

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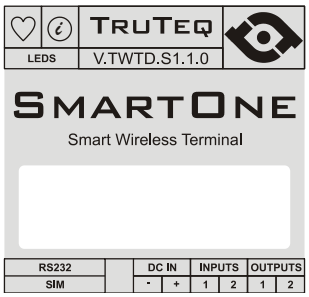
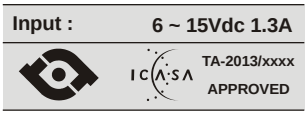
BOTTOM:

1.8 SmartOne Labels

The SmartOne is identified by the top and bottom labels. The Top label indicates the LEDs and IO connections and also the serial number. The serial number is visible from the top and includes the year of manufacture.	
The bottom label on the SmartOne indicates the Input power specification as well as the IMEI.	

2 EVENTS

An event is a change in condition and where certain commands then need to be executed.

2.1 Digital Input events

Separate Command Lists are linked to the events where an input goes high (on/open) or low (off/closed). The delay times (also known as the “debounce” times) before the unit registers a change in input state can be configured.

2.2 Timer events

Separate Command Lists are linked to the events where a timer runs out. There are 5 separate timers.

2.3 User Variable events

Separate Command Lists are linked to the events where a user variable reaches one of its low or high levels. There are 5 different user variables, each with its own high and low levels.

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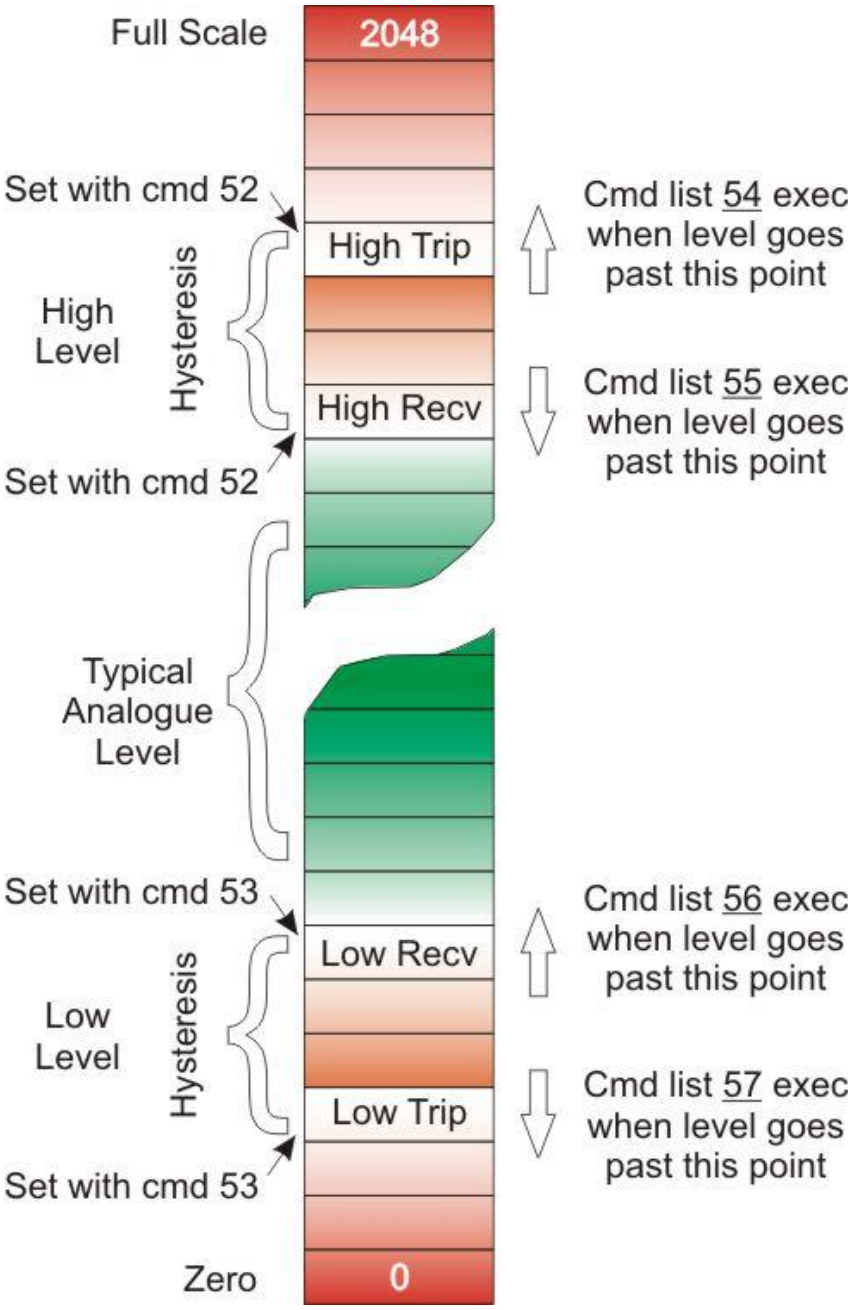
2.4 Analogue events

Separate Command Lists are linked to the events where an analogue value passes a certain level. The following diagram explains which command lists are associated with which level.



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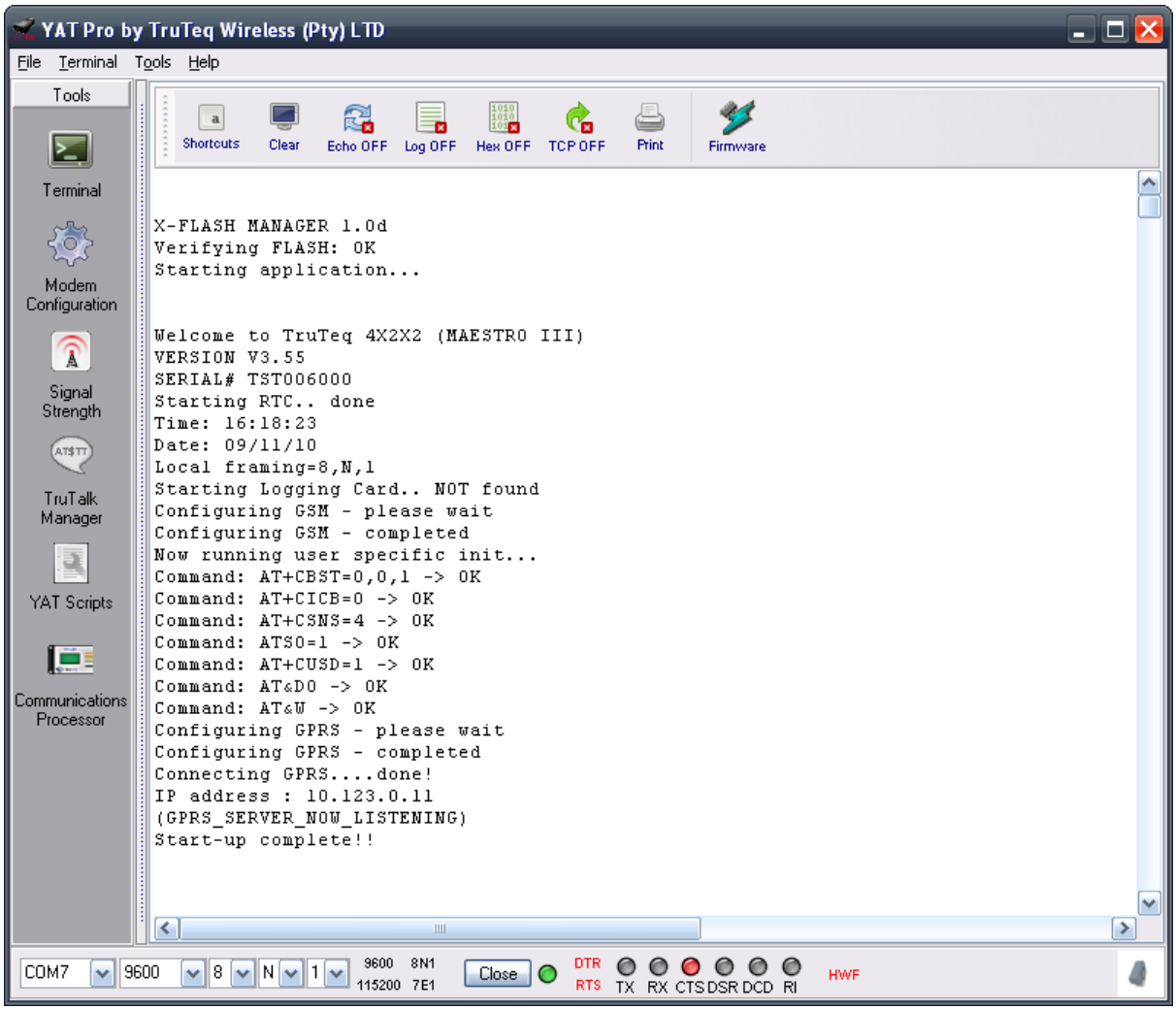
3 SMARTONE START-UP

The SmartOne will print ‘BOOT’ information on start-up. This information is printed on the serial port at the **last baud rate and framing that the SmartOne was set to with command 257.**
The SmartOne is ready for operation once the “Start-up complete!!” sentence is printed. One can now enter commands via command mode (AT$TT) or use it as a standard modem.



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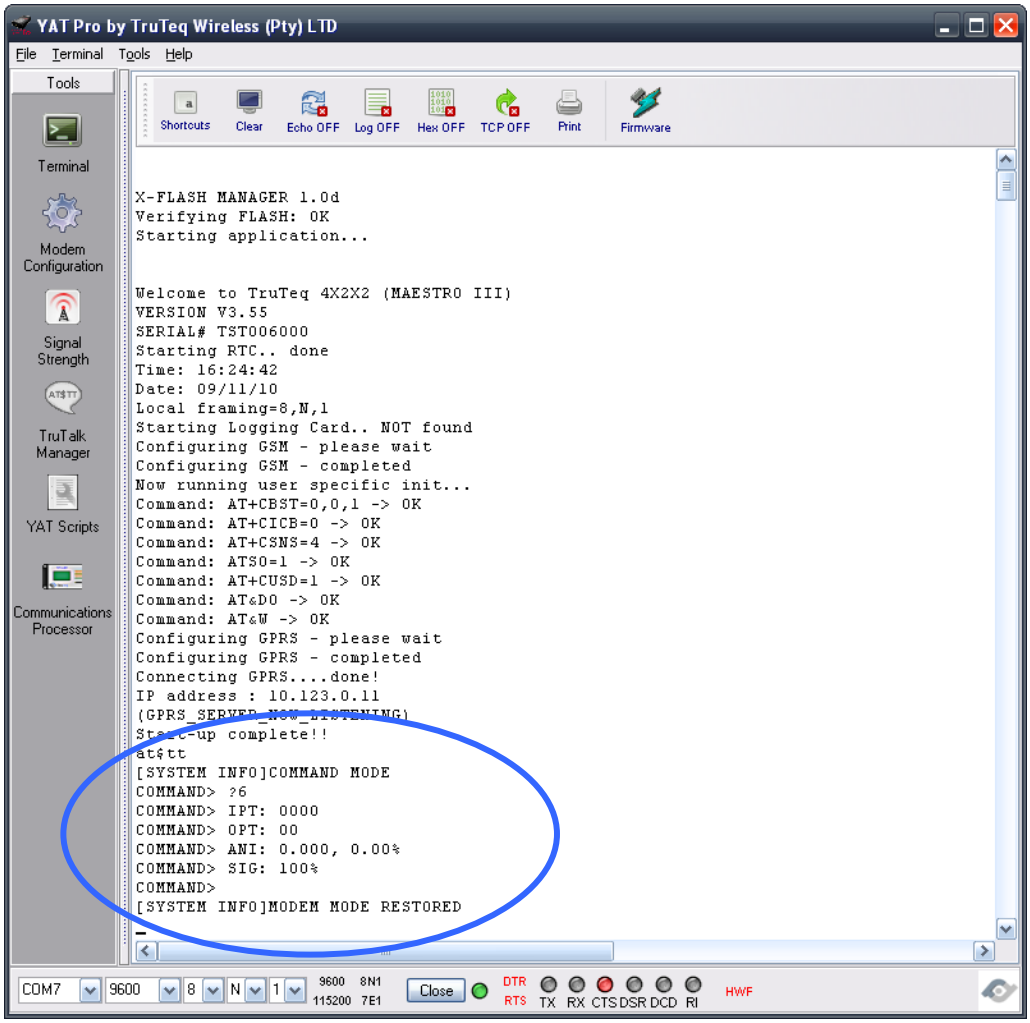
4 COMMAND MODE

By default the SmartOne serial port acts as a standard modem. However this serial port is also used to enter commands and to configure the SmartOne. The AT command AT$TT is used to enter the standard Truteq Text mode command prompt. The command mode will time-out after a default 30 seconds, or can be quitted by typing <ctrl-z>, this will return the SmartOne into normal modem mode.

A simplified command mode is also available for use with serial applications by entering AT$RT (Raw Text). In this mode there will be no echoing or prompts to simplify the serial encapsulation in a typical application.

4.1 Entering Commands

Commands can be entered once the SmartOne is in command mode.



Default serial parameters are: 9600,8,N,1.

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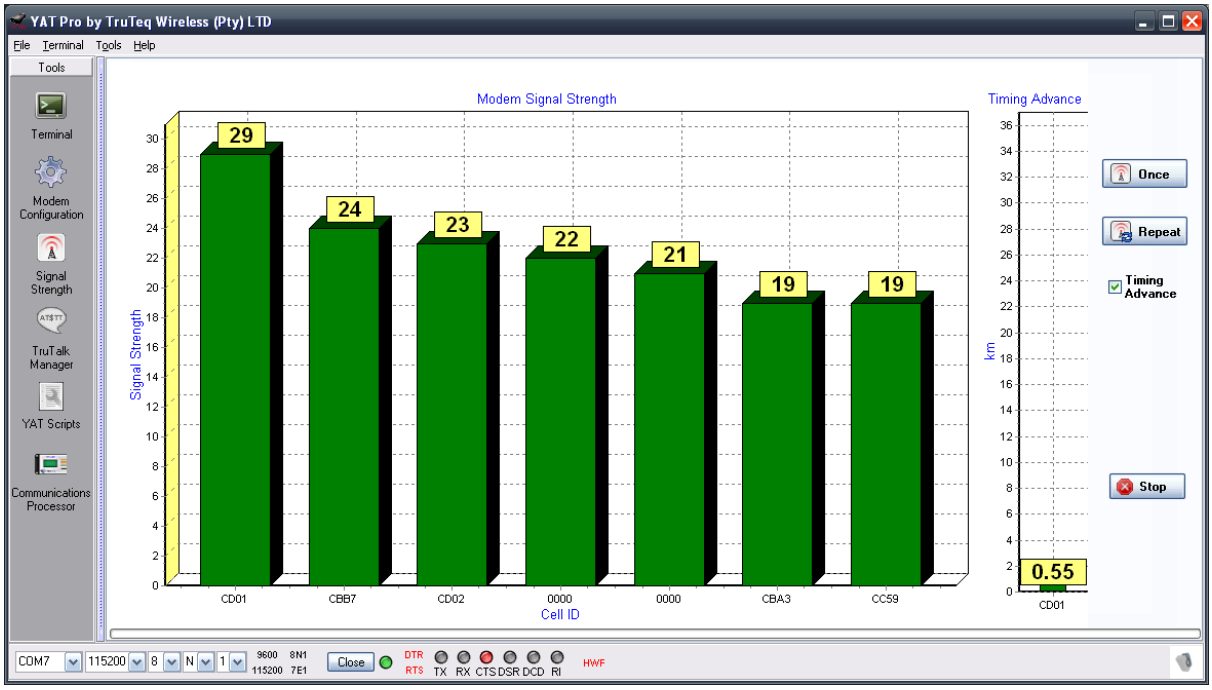
5 PROGRAMMING AND CONFIGURATION VIA YAT

5.1 Testing Installed Signal Quality

Use the **Signal Strength** tool in YAT to check the received signal strength of the serving cell as well as the neighbouring cells. Click on <Once> for a quick test, or <Repeat> to test the antenna at different positions. Timing Advance can be selected to determine and display the approximate distance to the serving cell. The first bar on the left is the signal strength to the serving cell and should be above 10 (green)



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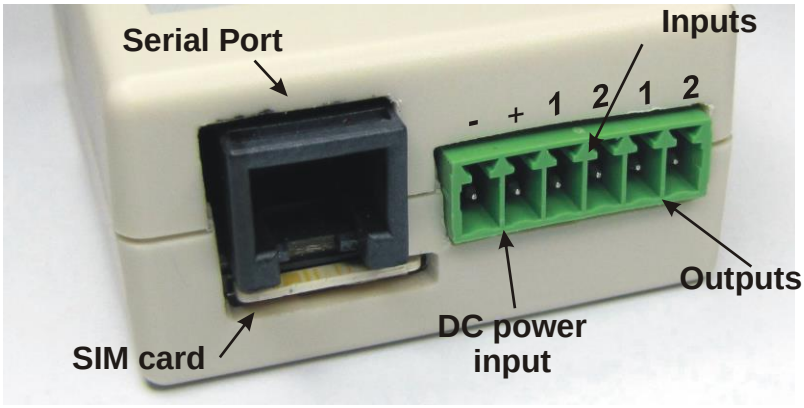
6 SMARTONE ELECTRICAL INTERFACES

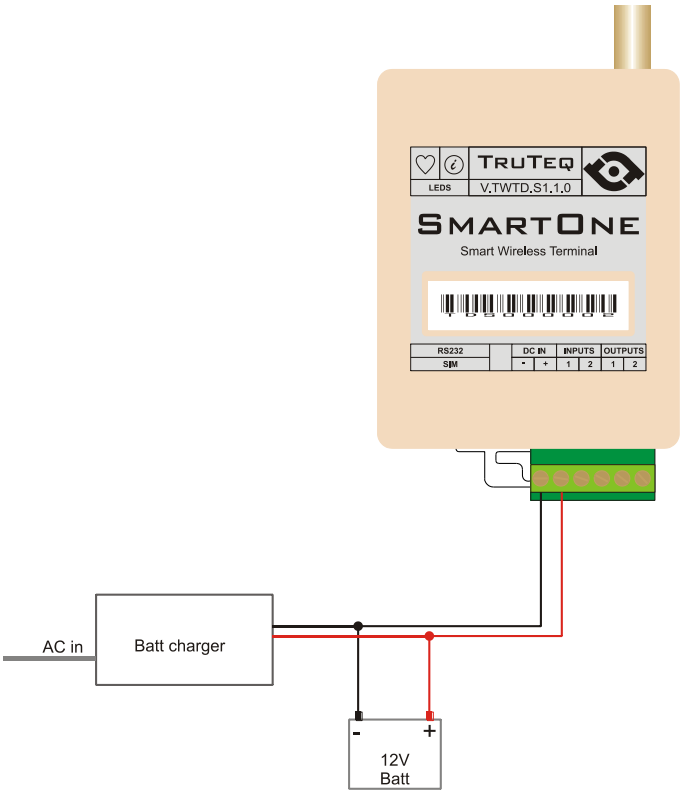


6.1 DC Power Supply

The TruCom SmartOne DC input is protected against reverse polarity and over voltage.

Input	Min	Max	Max Power	Input Protection
DC	6VDC	15VDC	10W	Tranzorb + Poly switch

Typical connection diagram:



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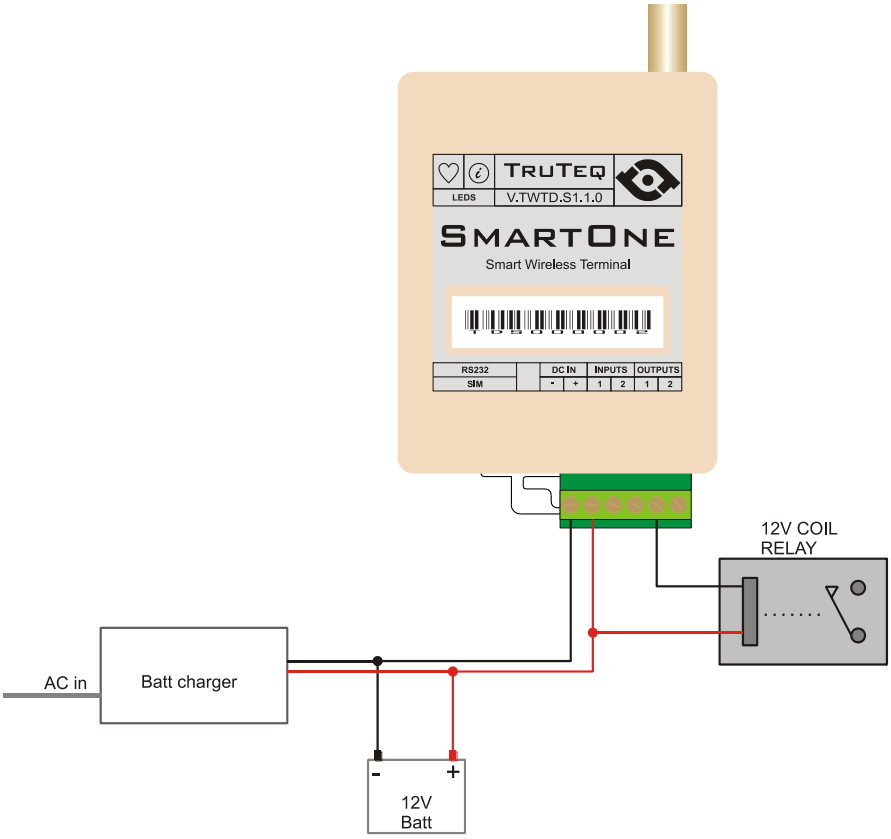
6.2 Digital Outputs

The SmartOne digital outputs are protected open collector format.
The output can sink 15Vdc 200mA

Typical connection diagram:



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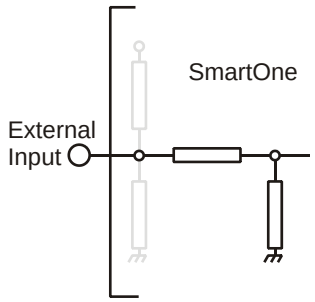
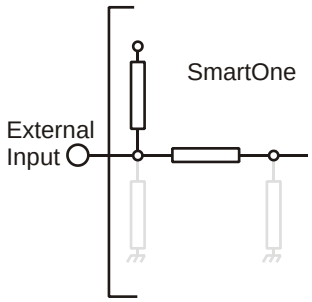
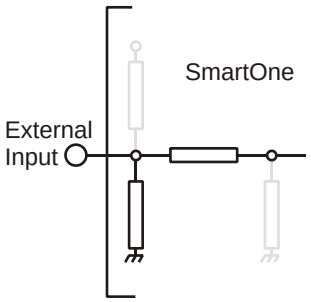
6.3 Inputs

The SmartOne inputs can be either Digital or Analogue.
In Digital mode the SmartOne can activate an internal weak pull-up to enable the use of a potential free contact as a digital input.
In Analogue mode that SmartOne can activate an internal voltage divider to enable the measurement of up to 22Vdc monitoring. Alternatively the SmartOne can activate an internal shunt load to enable the use of 4-20mA sensors.

Input options (set via command 31)

Voltage Divider (option 0)	Pull-Up (option 1)	Shunt (option 2)
		

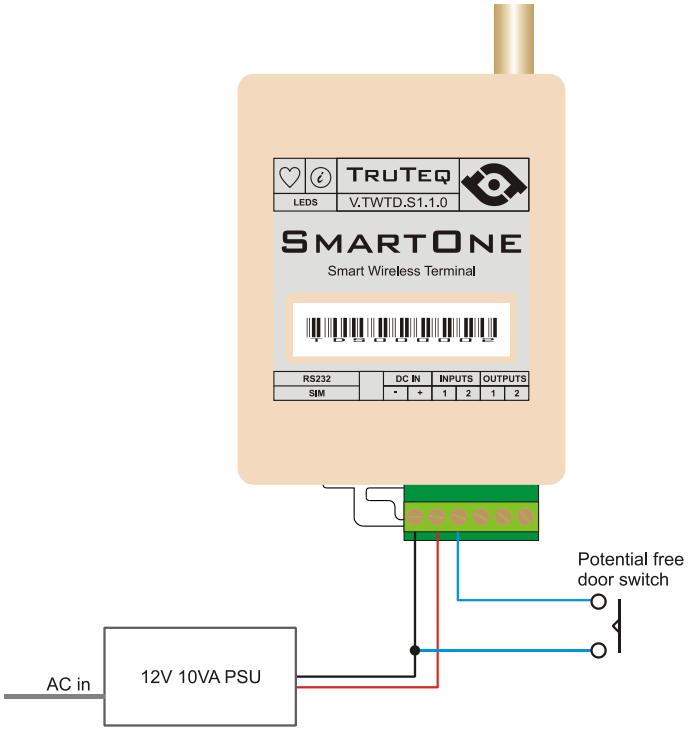
Note: See command !33 for Analogue and Digital selection options

Note: The SmartOne also monitors its own supply voltage – see command 180

Note: The SmartOne also has pulse counters – see commands 87 & 88

Typical connection diagrams:

Potential free digital (Pull-up option enabled):



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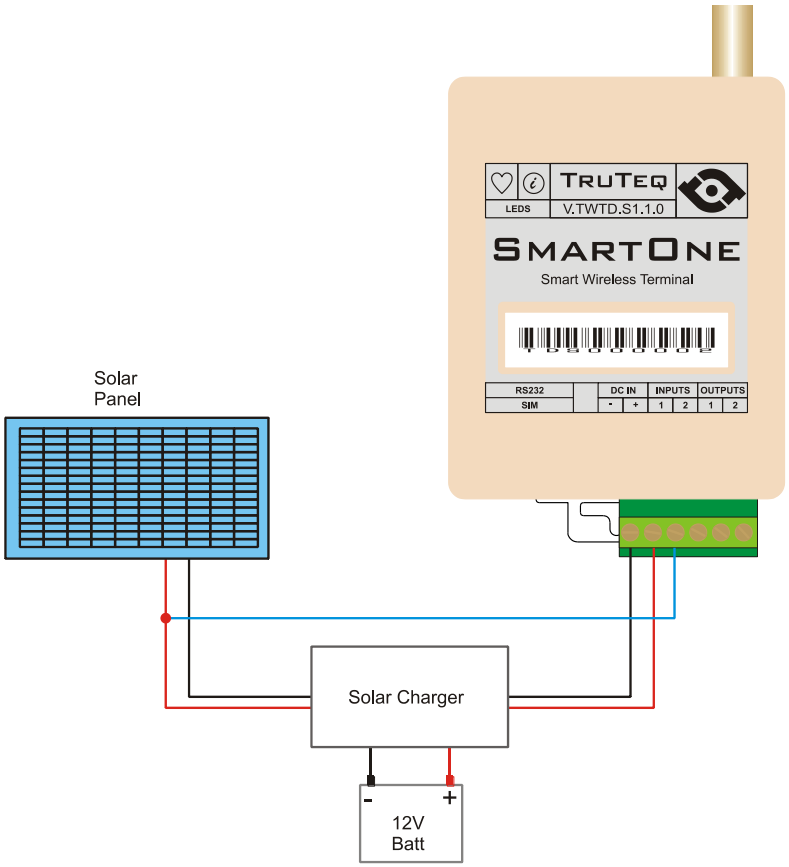
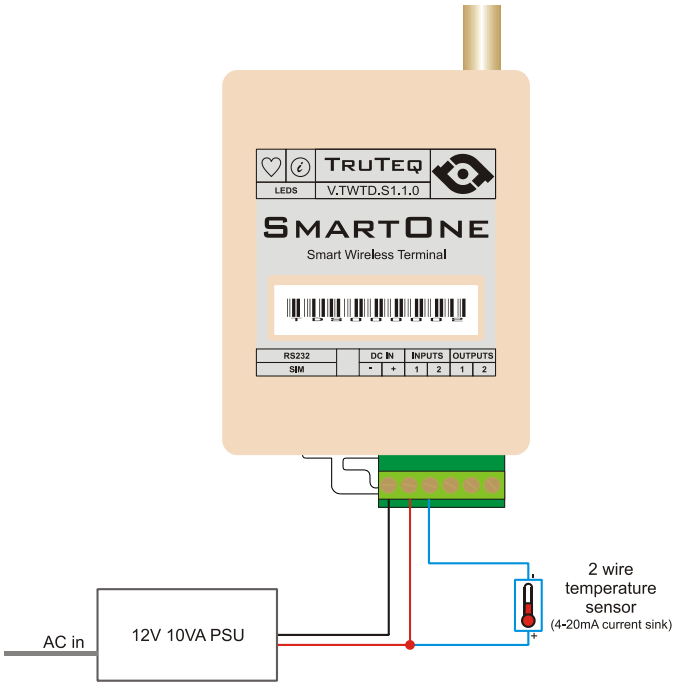
Analogue Voltage (Voltage Divider option enabled):



Analogue Current (Shunt option enabled):



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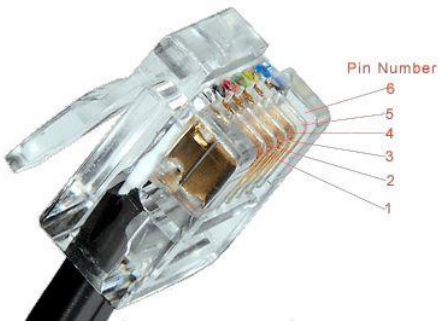
6.4 RS232 Data port

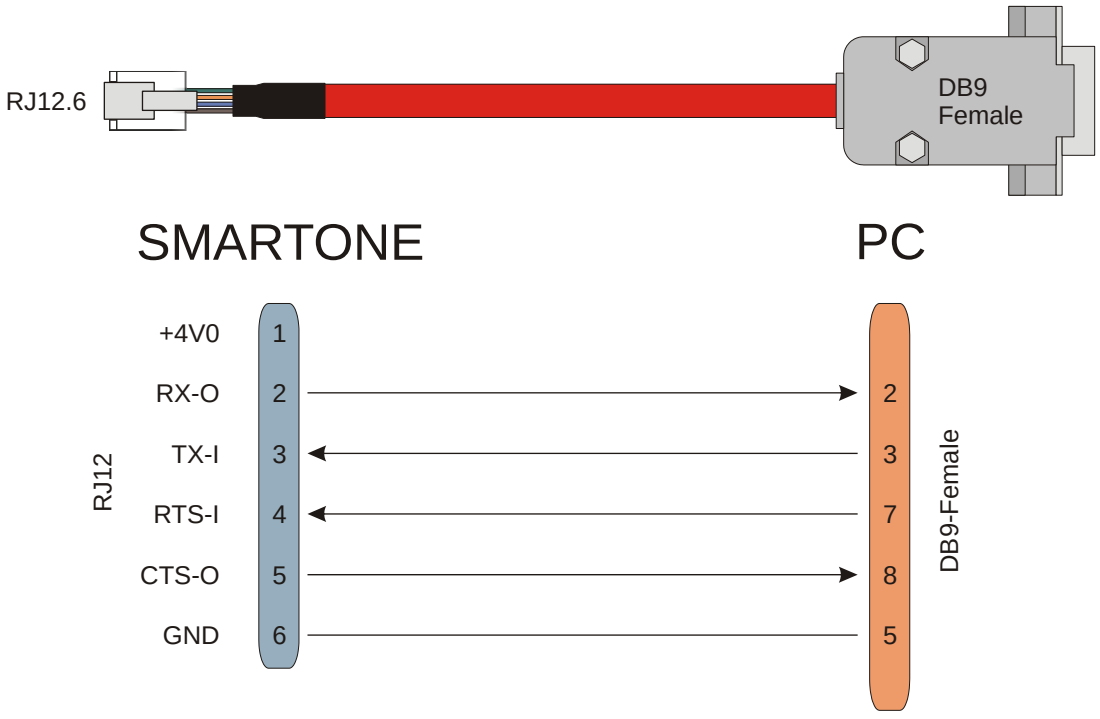
The RS232 port is the SmartOne primary data port. It is an RJ12.6 socket with the following pin-out:

Pin number	Description	Direction
1	+4V	Out
2	RX data	Out
3	TX data	In
4	Flow control	In
5	Flow control	Out
6	GND	--



Note: The flow in and out functions can be defined as: RTS, CTS, DCD, DTR, RI or none – for more information see command 259

6.4.1 PC serial cable pin-out (Part# SO_RJ12_DB9_PC)



To use the above configuration then RTS and CTS needs to be enabled by setting !259 1 1

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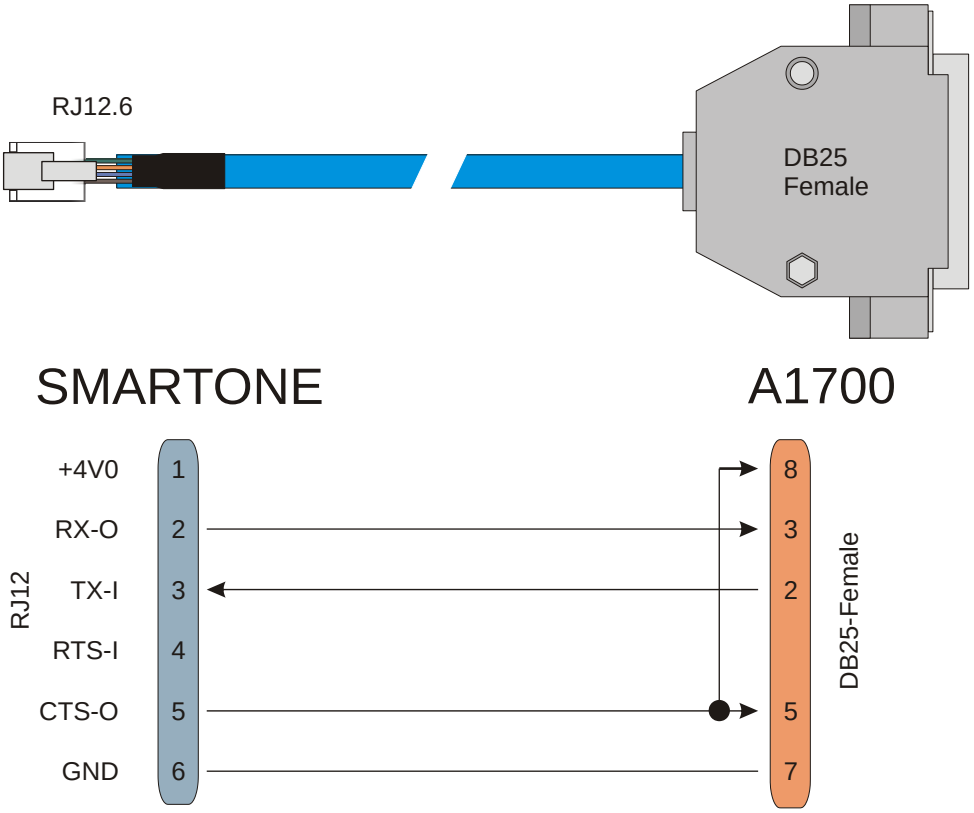
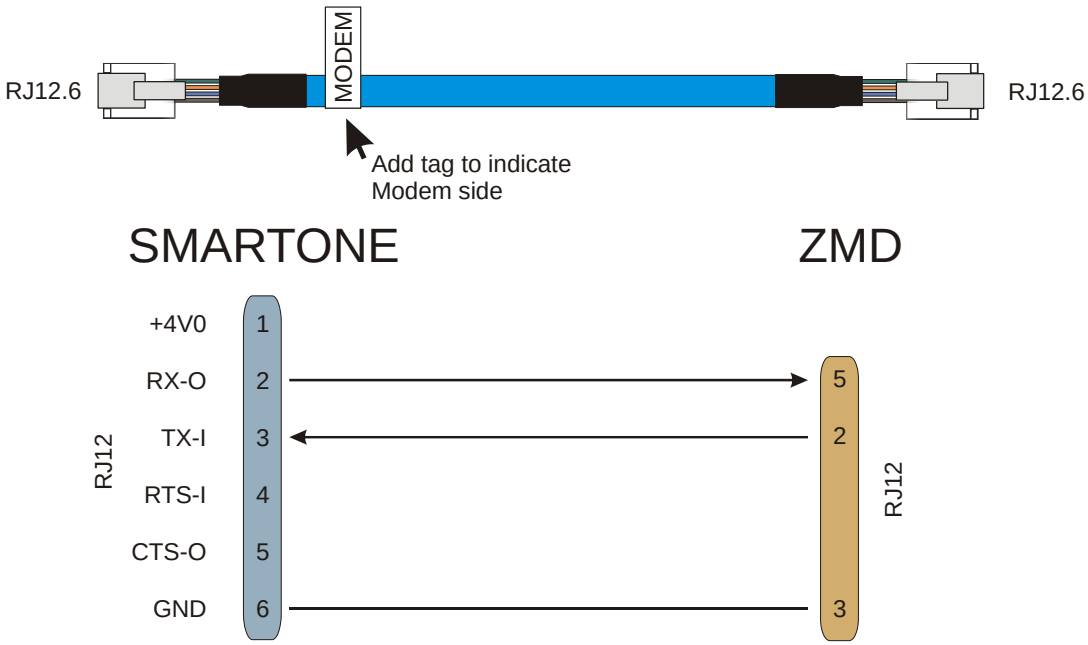
6.4.2 DB25 serial cable pin-out (Part# SO_RJ12_DB25_A1700) (for Elster meters)



To use the above configuration then CTS needs to be enabled by setting !259 1 0

6.4.3 RJ12 serial cable pin-out (Part# SO_RJ12_RJ12_ZMD) (for Landis&Gyr meters)



To use the above configuration then flow control needs to be disabled by setting !259 0 0

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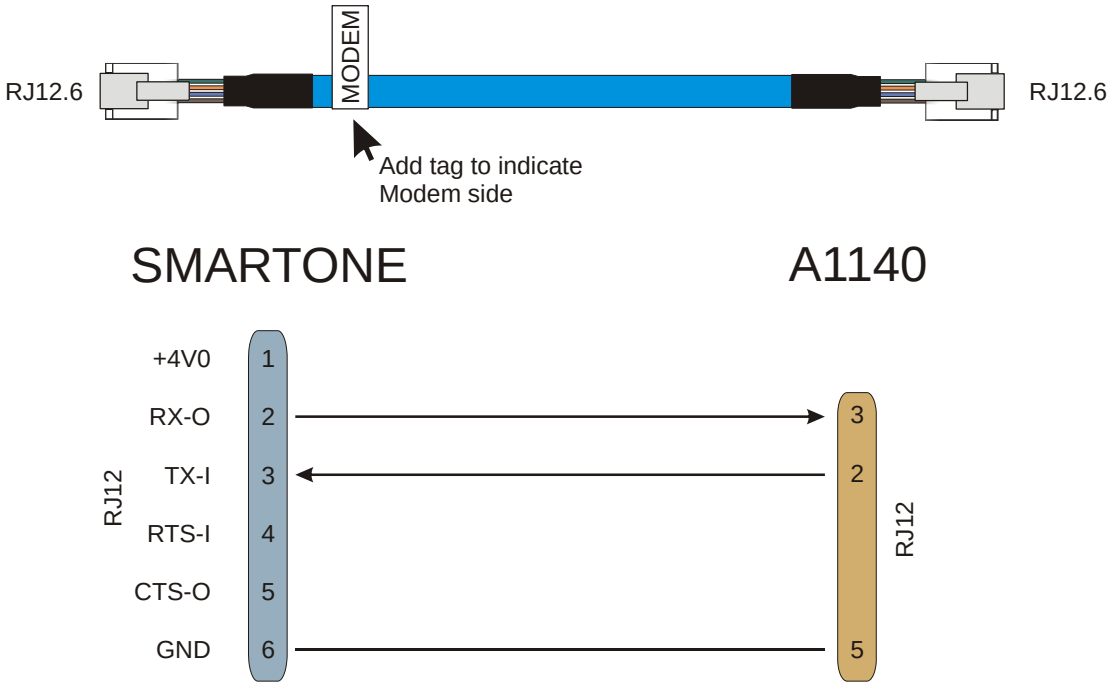
6.4.4 RJ12 serial cable pin-out (Part# SO_RJ12_RJ12_A1140) (for Elster A1140 meters)



To use the above configuration then flow control needs to be disabled by setting !259 0 0

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7 ELECTRICAL SPECIFICATIONS

Power supply:

Input	Min	Max	Max Power	Input Protection
Low voltage DC	6VDC	15VDC	10W	Tranzorb + Poly switch

Antenna Connector

Type	SMA
Gender	Female
Impedance	50Ω

8 OTHER SPECIFICATIONS

8.1 Physical

Size	51mm x 75mm x 27mm
Weight	95g
Casing material	ABS (plastic)
Temperature rating	-10°C to 60°C
Humidity	Up to 90% RH non-condensing

8.2 Manufacturer's Type Number

The type number for the SmartOne is V.TWTD.S1.1.0

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9 DISCLAIMER

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NOTE: This product is **not designed or certified** for use as medical equipment or with medical equipment or with medical devices. This product is also **not designed or certified** to be used with any medical services or medical related services.

10 GLOSSARY

Abbreviation	Description
API	Application programmers Interface
ASN.1	Abstract Syntax Notation One
CDR	Charge Data Record
CSV	Comma Separated Values
DB	Database
DNS	Domain Name System
FQDN	Fully Qualified Domain Name
GAIN	Gateway Application and Interface Node
HTTP	Hypertext Transfer Protocol
HTTPS	HTTP Secure
IVR	Interactive Voice Response
I/O	Input/Output
IP	Internet Protocol
MMS	Multimedia Message Service
MMSC	Multimedia Messaging Service Centre
PDA	Personal Digital Assistant
SMSC	Short Message Service Centre
SMPP	Short Message Peer to Peer Protocol
USSD	Unstructured Supplementary Services Data
WIG	Wireless Internet Gateway
WAP	Wireless Application Protocol
WML	Wireless Mark-up Language
WASP	Wireless Application Service Provider
XML	Extensible Markup Language

11 REVISION INFORMATION

Date	Version	Comments	Author
31 May 2013	1.01	Create document	Eric Guldemond
9 April 2014	1.02	Add comment on pulse counters	Eric Guldemond
19 May 2014	1.03	Add command 259 flow control options	Eric Guldemond

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12 CONTACTING TRUTEQ WIRELESS

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